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# Laparoscopic cholecystectomy under spinal anesthesia in a 5-year-old child: A case report

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## ABSTRACT

Symptomatic cholelithiasis in pediatric patients should be dealt with cholecystectomy. Due to its minimally invasive nature, laparoscopic approach is better than conventional open approach. Although safety of spinal anesthesia (SA) in adult laparoscopic surgeries including cholecystectomy is well established, its use in pediatric laparoscopic surgeries is extremely limited with only a few studies being published till date. Here, we report a case of laparoscopic cholecystectomy (LC) in a 5-year-old child which was successfully managed with SA. This may be the very first case report of pediatric LC under SA.

**Key words:** Laparoscopic cholecystectomy; Laparoscopic surgery; Spinal anesthesia; Children

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## INTRODUCTION

Cholelithiasis or gallstone disease is a relatively rare entity in pediatric population with prevalence of up to 0.13–0.22.[1] Like adults, elective management of symptomatic cholelithiasis in children is also cholecystectomy.[1] Laparoscopic approach is considered the gold standard due to minimally invasive nature of procedure thus causing less post-operative pain, reduced hospital stay, and faster recovery.[1] Until the past decade, the choice of anesthetic technique in laparoscopic cholecystectomy (LC) was exclusively limited to general anesthesia (GA) only and it had been described that GA with endotracheal intubation and positive pressure ventilation effectively suppresses the hemodynamic and respiratory consequences of pneumoperitoneum with protection against risk of aspiration.[2] However, with ongoing evidence-based practice, the concept is now changing. While a consensus is yet to be reached, recent studies tend to favor spinal anesthesia (SA) in LC in adults with excellent muscle relaxation, better perioperative hemodynamics, decreased surgical bed oozing, faster return of gut function, and lesser risks in elderly or in patients with systemic diseases such as respiratory (specially COPD, i.e., chronic obstructive pulmonary disease), hepatic, renal disease, diabetes (minimal risk of unrecognized hypoglycemia), and avoidance of complications associated with GA.[2,3] However, while no definite contraindications exist, studies pertaining to laparoscopic surgeries under SA in children are lacking. Here, we report a case of LC under SA in a 5-year-old child. To the best of our knowledge, it is the first case report of LC under SA in a child (i.e., age <12 years).

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## CASE REPORT

A 5 years 7-month-old female child presented to us complaining of occasional right upper quadrant pain associated with nausea/vomiting. Ultrasonography whole abdomen revealed distended gallbladder with thickened wall and a 6 mm tiny calculus in lumen. Except mild leukocytosis (total leukocyte count 14,500/cu.mm), other investigation reports were within normal limits. Elective LC was planned. Pre-anesthesia check-up was done and clinical examination was uneventful.

The patient was admitted 1 day before the scheduled surgery and was re-examined (including measurement of weight, which was 19 Kg) and interviewed. Whole procedure was explained to the patient and her legal guardians (parents, as she was a minor) and written informed consent was taken. American Society of Anesthesiologists fasting guideline was followed.

On arrival in the operation theater, monitors were attached and baseline parameters such as heart rate (HR), non-invasive blood pressure (NIBP), oxygen saturation ($SpO_2$), electrocardiogram (ECG), and temperature were recorded. A 20 Gauge intravenous cannula was inserted and patient was premedicated with inj. Ondansetron 2 mg slowly in intravenous (i.v.) route. As patient was too anxious in an unfamiliar set up, mild sedation given with inj. Glycopyrrolate 0.2 mg and inj. Ketamine 20 mg slow i.v. Preloading with 10 ml/Kg of Ringer's Lactate (RL) infusion was done. Lumbar puncture was performed in sitting position (with help of an assistant as patient was mildly sedated) at L3-4 interspace through a midline approach using a 27 Gauge Quincke spinal needle. After correct needle placement was identified (by free flow of cerebrospinal fluid) and confirmed (by aspiration), 1.6 ml of inj. Bupivacaine (0.5%) heavy (dextrose 8% added) was injected at a rate of 0.2 ml/s.[4] Immediately after SA, the patient was placed in 20° Trendelenburg position until the sensory block reached T4 dermatome (assessed roughly by pin prick method, as patient was mildly sedated) and then positioned supine. Vital signs such as HR, NIBP, $SpO_2$, ECG, and temperature were recorded at 2 min interval throughout the intraoperative period. Carbon Dioxide ($CO_2$) insufflations pressures were held under 8 mm Hg, and the flow was preserved between 2.0 and 2.5 L/min.[5] Conventional four port LC was done. Intraoperative period was uneventful except an episode of hypotension (defined as mean arterial pressure lower than 20% of baseline) which was managed with inj. Mephentermine 3 mg i.v. bolus and total 500 ml RL was infused. Diclofenac suppository 25 mg was given after completion of surgery. Feeding, beginning with sips of water, was allowed 3 h after post-operation. Analgesia was maintained with paracetamol suspension 5 ml (250 mg/5 ml) thrice daily. Motor recovery, spontaneous diuresis, and tolerance to oral route were smooth without any potential side effect. The patient was discharged uneventfully on 2nd post-operative day.

## DISCUSSION

The history of pediatric SA is rooted back to 1898, when Bier introduced SA and two out of his first six patients were children![6] As early as in 1984, Abajian established the safely of SA in children including infants, but, still today, this mode of anesthesia is often underutilized in pediatric population.[6] Recently, a surge in pediatric SA has been documented as the search for a safer alternative to GA continues, which is devoid of potential risks and complications associated with it.[4] Paucity of large scale multi centric studies may hinder the wide acceptability of pediatric SA in modern day practice.[7] Although available studies indicate a favorable, safer outcome in pediatric SA when proper technique, detailing and patient selection is attained, its applicability in laparoscopic surgeries in children is still debatable and studies are lacking. There are studies depicting laparoscopic surgeries in infants under SA with encouraging results.[8-10] Fewer failures may be attributed to anatomic variability in infants causing inability to access intrathecal space and echo-guided techniques may be beneficial in these cases.[8,4] Opfermann et al., successfully used epidural anesthesia for diagnostic laparoscopy with or without an ensuing orchidopexy in 20 children aged <3 years.[11] Hannan et al., performed a case series of 77 consecutive pediatric (5–8-year-old children) laparoscopic appendectomies, 40 patients under SA and 37 under GA.[5] They noticed several advantages of SA such as cost reduction and less post-operative vomiting leading to better patient comfort and earlier discharge.

We did an extensive literature search before proceeding with this case. Under experienced hands and in selected cases, safety of pediatric SA has now been established.[4,6,7] Recent studies indicate that SA may be used as a primary mean for pediatric laparoscopic surgeries without any potential adverse outcome.[5,8-10] There are separate studies of SA for laparoscopic surgeries in preschool or school age children and in supraumbilical procedures.[5,6,8] Studies on anesthesia for pediatric laparoscopic surgeries did not reveal any absolute contraindication against SA for LC.[12] We were ready for immediate conversion to GA, had there been any unforeseen adverse events. Keeping in mind the increased vagal tone associated with children, inj. Atropine and inj. Adrenaline were kept standby. Cautions were taken to prevent volume overloading and extreme positioning. Intrathecal drug dosage, $CO_2$ insufflations pressures, and

flow were referenced from previous studies.[4,5] Careful patient monitoring done throughout perioperative period.

In summary, we believe that SA can be administered safely for LC in children. We recommend the followings-

1. Experienced pediatric anesthesiologist
2. Proper case selection (surgery time <60 min)
3. Right dosage of intrathecal local anesthetics
4. $CO_2$ insufflations pressures <8 mm Hg, flow 2.0–2.5 L/min
5. Careful patient monitoring.

However, further reports are needed to assess the feasibility and safety of SA in pediatric LC.

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